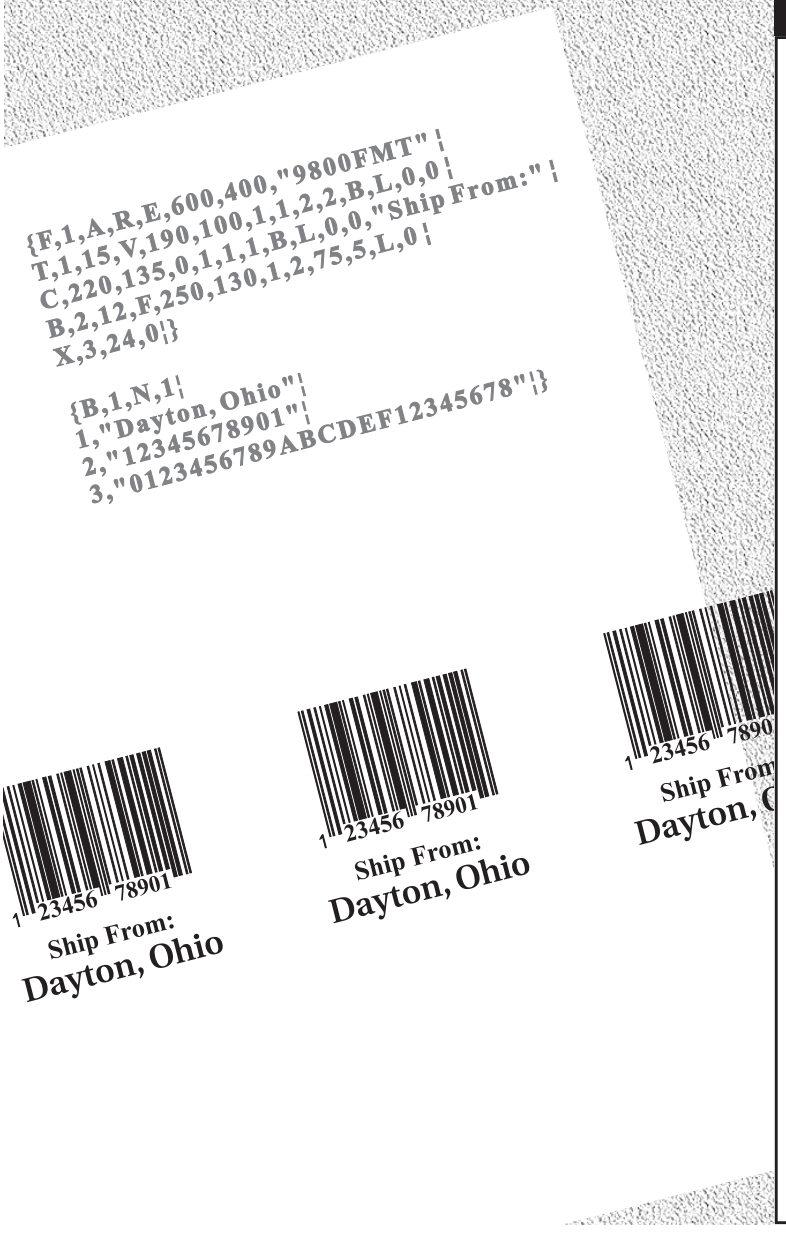
Multi-Protocol Application Notes

Monarch® 9855® RFID Printer



AVERY DENNISON

TC9855RFIDMPAN Rev. AJ 9/08

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GETTING STARTED

1

Your Monarch® 9855™ RFIDMP (Radio Frequency Identification Multi-Protocol) printer has been engineered to program (encode) an RFID label (commonly called “RFID tags”) before the label’s format is printed. RFID tags contain an embedded RFID inlay (chip and antenna).

RFID is only available using die cut or black mark supplies. Linerless supplies are not currently supported. The RFID printer is also capable of printing standard (non-RFID) supplies. For more information about supplies, see “About RFID Supplies.”

The printer supports multi-protocol encoding, including Class 1 Generation 1 (C1Gen1), Class 1 Generation 2 (C1Gen2), and EM4122 supplies.

Note: Information in this document supercedes information in previous versions.

Using This Manual

The following table lists the contents of this manual.

Chapter		Contents
1	Getting Started	Information you should know before using the printer.
2	Multi-Protocol Encoding	Using the RFID menu to setup the printer and select a protocol. Also includes information about RFID supplies.
3	Setting Up the Printer	Using the Setup menu to select an overstrike mode for the printer.
4	Defining the RFID Data Field	Using Monarch® Printer Control Language II (MPCLII) to create an RFID format. Also includes sample data streams.
5	Troubleshooting	Describes RFID errors that may occur.

Use the *RFID Quick Reference* (provided with your printer) for supply loading and maintenance information.

Refer to the *RFID Setup Guide & Supply Chart* for illustrations to determine which type of RFID supplies you are using and basic printer configuration information

Audience

These *RFIDMP Application Notes* are written for the System Administrator, who is creating formats for the 9855 multi-protocol printer.

About Transponder Types

The following table describes the transponder types.

Transponder Type	Description
Class 0	A type of transponder that allows read and write capability with 96-bits.
Class 0+	A type of transponder that allows read and write capability with 96-bits.
Class 1 Gen1 or Class 1 Gen2	A type of transponder that allows read and write capability with 64 or 96-bits.

The RFID supplies are sensitive to static electricity and can be damaged by static electricity. Ground yourself by touching some metal, such as the printer's metal base, before handling the supplies.

RFID Terms to Know

Review these terms before you continue.

EPC — The Electronic Product Code, which is a numbering standard for items, similar to the UPC code for bar coding. The EPC is divided into several sections: Header, Manager Number, Object Class, and Serial Number.
One of the memory fields reserved for EPC programming. This memory is separate from the user memory and the amount of EPC memory varies with the tag types.

Inlay — A type of media that contains a transponder and is converted for use in Monarch® RFID supplies (tags). Inlays can be made with different types of transponders (Class 0, Class 1, etc.).

Interrogator — The electronics module that programs the RFID tags through the antenna.

RFID Data Field — The Monarch® Printer Control Language II (MPCLII) data field containing the information to program into an RFID tag.

RF Field — Area inside the printer where the RFID tag is programmed. The RF field area is controlled by the RFID power level and the antenna.
Note: The printer's antenna is located between the platen roller and supply guide inside a bracket.

RFID Power — Increases the strength of the RF field emitted by the printer's antenna to read and program the RFID tags.

RFID Reader — An *optional* external device that reads the RFID tags after they are programmed.

RFID Tags — Supplies that contain an embedded programmable chip and antenna.

TID — The Transponder Identification Number, which contains the chip type, features, and available custom commands supported for tag authentication.

Transponder The combination of the embedded programmable chip with an antenna on some type of media (film, paper, etc.). Different types of transponders are available (Class 1 Gen1 or Class 1 Gen2).

User Memory One of the memory fields reserved for user programming. This memory is separate from the EPC memory and the amount of programmable user memory varies with the tag types.

RFID Considerations

- Printing over the RFID tag (or inlay) causes printing irregularity.
- You may want to purchase an RFID Reader to verify the RFID tags after printing them.
- Do not use batch separators, which prints a pinstripe pattern on a label; or skip index mode, which prints ONE format over multiple labels, since these features unnecessarily waste a label. A batch separator label is different from an overstrike label.

MULTI-PROTOCOL ENCODING 2

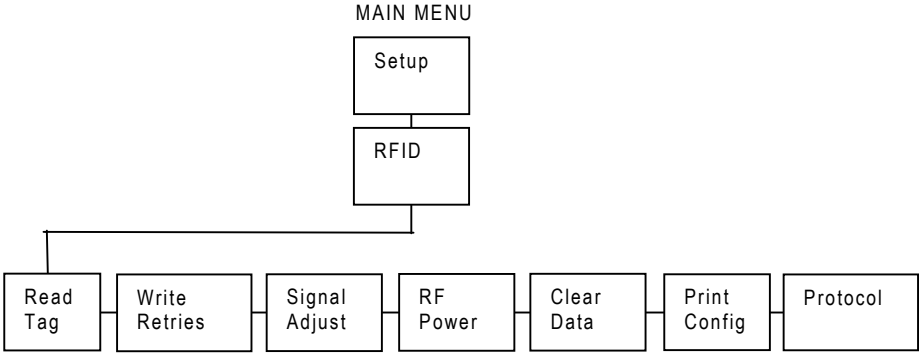
This chapter contains specific information for the multi-protocol printer, including using the RFID, Setup Menu.

About RFID Supplies

RFID supplies are available in a variety of sizes. Printing over the RFID tag (or inlay) causes printing irregularity. Refer to the *RFID Setup Guide & Supply Chart* for illustrations to determine which type of RFID supplies you are using and basic printer configuration information.

Using the RFID Setup Menu

Use the RFID Setup Menu to Read a tag, set the number of Write Attempts, Read Power, Write Power, Clear Data, print an RFID Configuration label, and select a different Protocol.



Option	Choices	Default
Read Tag	NA	NA
Write Retries	1-5	3
Signal Adjust	0-6	2
RF Power	Read Power 1-25/ Write Power 1-25	18
Clear Data	Yes/No	No
Print Config	Yes/No	No
Protocol	C1Gen2 C1Gen1 96 C1Gen1 EPC64/96 EM4122	C1Gen2

When you turn on the RFID printer, “Monarch Initializing” flashes briefly and then you see “Print Mode Ready.” If an error occurs while the printer is initializing, the error message flashes briefly on the display and then you see “Print Mode Ready.” The printer displays “Not available” when you try to select the RFID menus if the module is inoperative.

The printer accepts RFID and non-RFID batches once you see “Print Mode Ready.”

Read Tag

Use this option to read the EPC data programmed into an RFID tag. You cannot read the user memory data.

To change the setting, from the Main Menu, select Setup, then RFID. Then follow these steps.

1. Press ← or → until you see

   ```
   RFID
   Read Tag        →
   ```

2. Lay the RFID tag you just programmed inside the supply path with the tag's antenna over the printer's box antenna. (The box antenna is located behind the platen roller.)

3. Press **Enter/Pause**. Data appears on the display.

   If the tag cannot be read "Illegal Command" appears briefly on the display. Try slightly moving the tag forward or back in the supply path over the box antenna and try again.

   If the tag can be read, you see the EPC data, such as

   ```
   Complete
   0123456789ABCDEF
   ```

   The programmed data is always displayed in ASCII Hex format, regardless of which data type was entered.

   Press → to scroll through the data (if using a 96-bit RFID tag).

   Press **Enter/Pause** or **Escape/Clear** to return to the RFID Menu.

4. Press **Escape/Clear** until you see the Main Menu.

Write Retries

Write Retries is the number of times the interrogator tries to program the RFID tag in the RF Field. If the interrogator fails to program the RFID tag, an RFID error is generated. See "RFID Errors" for more information. When an RFID error is generated, the printer may automatically print an overstrike pattern. See "Setting the Error Action" for more information.

If the RFID tag is programmed on the first try, the module proceeds to the next step in the cycle. If not, the module attempts to program the tag up to the Write Retries setting. The range is one to five, with a default setting of three. Maximum throughput results when tags are programmed on the first try.

If Write Retries is set to one, the printer's throughput may be increased; however, a good RFID tag may be reported as not programmable. If Write Retries is set to five, the printer's throughput may be decreased; however, the number of RFID tags programmed may or may not increase.

1. Press ← or → until you see

   ```
   RFID
   ←  Write Retries  →
   ```

2. Press **Enter/Pause**. The current setting is displayed, for example:

   ```
   Write Retries?
   [1/5]:  +3
   ```

3. Press ← or → to increase or decrease the setting. After you display the option you want, press **Enter/Pause**.

4. Press **Escape/Clear** until you see the Main Menu.

Signal Adjust

Use the Signal Adjustment to increase the strength of the RF Field emitted by the printer's antenna. The higher the value, the greater the power of the RF Field.

When using the read-only EM4122 protocol, the settings for Write Power and Signal Adjust are ignored.

CAUTION: Use extreme caution when changing the Signal Adjustment because the RFID tags may become non-functional!

To change the setting, from the Main Menu, select Setup, then RFID. Then follow these steps.

1. Press ← or → until you see

   ```
   RFID
←  Signal Adjust  →
   ```

2. Press **Enter/Pause**. The current setting is displayed, for example:

   ```
   SIGNAL ADJUST
   [0/6]:  +2
   ```

3. Press ← or → to increase or decrease the setting. After you display the option you want, press **Enter/Pause**.

4. Press **Escape/Clear** until you see the Main Menu.

RF Power (Read/Write Settings)

Use the RF Power menu to set the Read and Write power settings. The Read and Write Power settings increase the strength of the RF Field emitted by the printer's antenna. The higher the value, the greater the power of the RF Field.

If either the Read or Write Power settings are too high or too low, you may not be able to read the tags or you may change the data that was programmed in to adjacent RFID tags.

When using the read-only EM4122 protocol, the settings for Write Power and Signal Adjust are ignored.

CAUTION: Use extreme caution when increasing or decreasing the Read and Write Powers because the RFID tags may become non-functional!

To change the settings, from the Main Menu, select Setup, then RFID. Then follow these steps.

1. Press ← or → until you see

   ```
     RFID
   ← RF Power
   ```

2. Press **Enter/Pause**. You are prompted to enter the Read Power.

   ```
   READ POWER
   [1/25]:  +14
   ```

3. Press ← or → to increase or decrease the setting. After you display the option you want, press **Enter/Pause**. Next, you are prompted to enter the Write Power.

   ```
   WRITE POWER
   [14/25]:  +14
   ```

   Notice the value you entered for the Read Power is shown as the lowest value available for the Write Power. (14 in the example above.)

4. Press ← or → to increase or decrease the setting. After you display the option you want, press **Enter/Pause**.

5. Press **Escape/Clear** until you see the Main Menu.

Clear Data

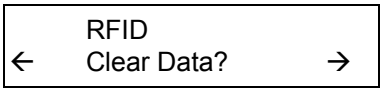
The printer keeps track and stores the following items that can only be cleared when you select "Yes" to clear data:

- The number of RFID tags successfully programmed.
- The number of RFID tags that failed programming.

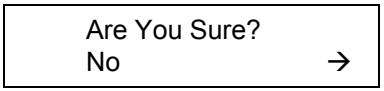
Depending on your application and volume of labels printed, you may want to clear this data daily or after each batch.

To change the setting, from the Main Menu, select Setup, then RFID. Then follow these steps.

1. Press ← or → until you see



2. Press **Enter/Pause**.



3. Press ← or → to see the other option. After you display the option you want, press **Enter/Pause**.
   If you select "Yes," all data collected since the last time it was cleared is erased.
   If you select "No," no data is erased.

4. Press **Escape/Clear** until you see the Main Menu.

Print Configuration Label

The RFID configuration label displays the module's Firmware and Hardware Versions, Module Type, Region, Frequency, all the Setup, RFID Menu options, Good RFID Tags (number of RFID tags successfully programmed since last cleared), and Bad RFID Tags (number of RFID tags that failed programming since last cleared).

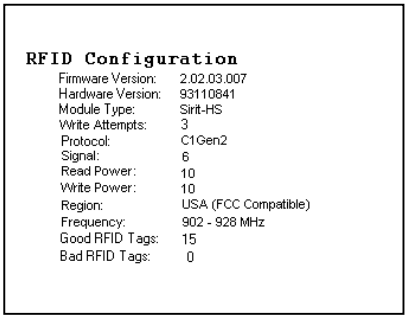
Depending on your application and volume of labels printed, you may want to print this configuration label daily or after each batch.

To change the setting, from the Main Menu, select Setup, then RFID. Then follow these steps.

1. Press ← or → until you see

   RFID
   ← Print Config

2. Press **Enter/Pause**. The configuration label prints.


RFID Configuration

Firmware Version:	2.02.03.007
Hardware Version:	93110841
Module Type:	Sirit-HS
Write Attempts:	3
Protocol:	C1Gen2
Signal:	6
Read Power:	10
Write Power:	10
Region:	USA (FCC Compatible)
Frequency:	902 - 928 MHz
Good RFID Tags:	15
Bad RFID Tags:	0

   You can also display the Firmware and Hardware Versions using the Diagnostics Menu. See "Version Information," in Chapter 3 for more information.

   The High Sensitivity module appears as **Sirit-HS** for the Module Type or **93110841** (or greater) for the Hardware Version.

3. Press **Escape/Clear** until you see the Main Menu.

Protocol

The multi-protocol printer supports the following UHF protocols:

Protocol	Use to...
C1Gen2 Class 1 Generation 2	Program ♦ 96-Bits of data into a 96-Bit RFID tag ♦ 64-Bits of data into a 96-Bit RFID tag The printer also accepts EPC data following the guidelines in the *EPCglobal™ Tag Data Standards* Specification, which conforms to the *EPC Radio-Frequency Identity Protocols Class 1 Generation 2 UHF RFID Protocol for Communications at 860-960MHz Standards* (RFID Air Interface protocol).
C1Gen1 96 Class1 Generation 1 96-Bits	Program 96-Bits of data into a 96-Bit RFID tag.
C1Gen1 EPC64/96 Class 1 Generation 1 EPC	Program ♦ 96-Bits of EPC data into a 96-Bit RFID tag ♦ 64-Bits of EPC data into a 64-Bit RFID tag ♦ 64-Bits of EPC data into a 96-Bit RFID tag **You must use EPC data following the guidelines in the *EPC™ Generation 1 Tag Data Standards* Specification for this protocol.** Refer to the EPC Specification to create valid EPC data. The first byte of EPC data determines the amount of data to program (64 or 96-Bits). Then, the 9855 printer programs the RFID tag accordingly.
EM4122	Read 64-Bits of EM4122 data from the RFID tag. The EM4122 protocol is read only from a pre-programmed RFID tag. You cannot program RFID data using the EM4122 protocol. To read data with EM4122, you must include Option 5 (Define Data Entry Sources) in your format. See Chapter 4, "Defining the RFID Data Field" for more information. Contact your RFID Account Manager to obtain EM4122 supplies.

After you select a different protocol, you are prompted to enter the new Read/Write Power settings and the Signal Adjustment. Refer to the *RFID Setup Guide & Supply Chart* provided with your printer for more information about those settings.

To change the setting, from the Main Menu, select Setup, then RFID. Then follow these steps.

1. Press ← or → until you see

	RFID
←	Protocol

2. Press **Enter/Pause**. The current setting is displayed, for example:

	PROTOCOL
	C1Gen2 →

3. Press ← or → to change the protocol. After you display the option you want, press Enter/Pause. When using the read-only EM4122 protocol, the settings for Write Power and Signal Adjust are ignored.

4. After you select a protocol, you are prompted to enter the Read Power.

READ POWER
[1/25]: +14

5. Press ← or → to increase or decrease the setting. After you display the option you want, press **Enter/Pause**. Next, you are prompted to enter the Write Power.

WRITE POWER
[14/25]: +14

   Notice the value you entered for the Read Power is shown as the lowest value available for the Write Power. (14 in the example above.)

6. Press ← or → to increase or decrease the setting. After you display the option you want, press **Enter/Pause**. Next, you are prompted to enter the Signal Adjust.

SIGNAL ADJUST
[0/6]: +2

7. Press ← or → to increase or decrease the setting. After you display the option you want, press **Enter/Pause**.

8. Press **Escape/Clear** until you see the Main Menu.

SETTING UP THE PRINTER 3

Use this chapter to

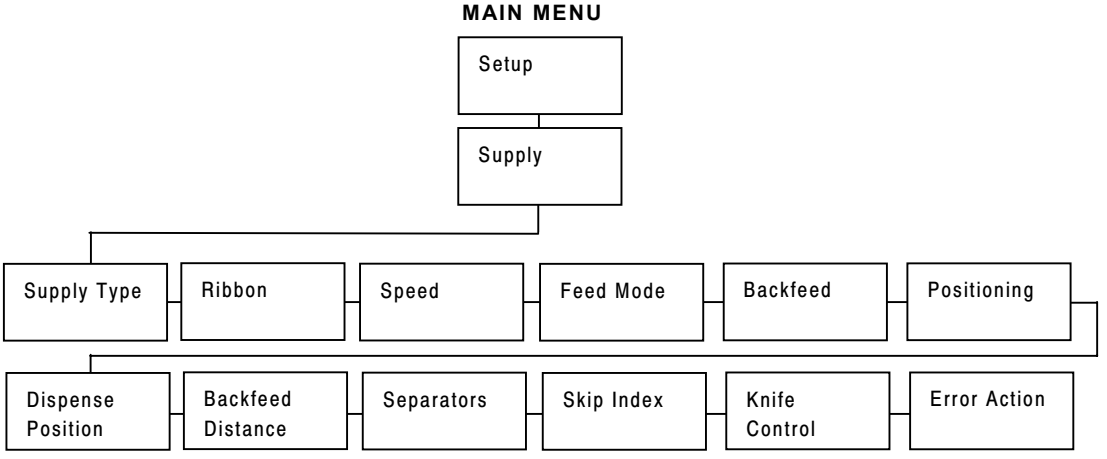
- set the supply and print positions, if necessary
- set the Error Action for RFID labels
- view the Diagnostics version information.

Setting the Print and Supply Positions

Do not modify the S*upply Position* when using RFID supplies greater than a two-inch feed length. Doing so may move the RFID tag out of the RF Field's readable and programmable range. If necessary, you can modify the Print Position; however, make sure you do not move the tag out of the readable and programmable range.

When using RFID supplies with a one-inch feed length, refer to the *RFID Setup Guide & Supply Chart* for the Supply and Print Position settings. (From the Main Menu, select Setup, Supply, Positioning, then select Print Position and Supply Position.)

Using the Setup Supply Menu



The following table lists the Supply Menu options.

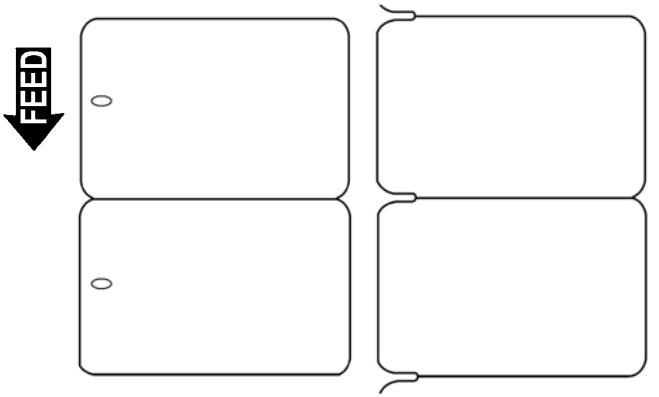
Option	Choices	Default	Use for RFID
Supply Type	Aperture/Die Cut/Black Mark/ Continuous/Tag Edge Aperture	Die Cut	Die Cut
Ribbon	No/Yes/High Energy	Yes	Any
Speed	2.5/4.0/6.0/8.0/10.0/Default **Note:** The printer pauses while programming the RFID tag.	Default	Any
Feed Mode	Continuous/On-Demand	Continuous	Any
Backfeed	Off/On/Extended	Off	Conditional*
Print Position	-450 to 450	0	Conditional*
Supply Position	-300 to 300	0	Conditional*
Margin Position	-99 to 99	0	Any
Cut Position	-300 to 300 **Note:** The knife is not currently supported for use with RFID supplies.	0	**0 only**
Dispense Position	50 to 200	65	Conditional*
Backfeed Distance	10 to 200	65	Conditional*
Separators	No/Yes/Long	No	**Not recommended**
Skip Index	No/Yes	No	**Not recommended**
Knife Control	-20 to 20	0	**0 only**
Error Action	Normal Overstrike/Continue 1x to 5x **Note:** If using “overstrike,” do not use Peel Mode.	Normal	Conditional*

* Depends on the supply’s feed length. Refer to the *RFID Setup Guide & Supply Chart* for the Supply and Print Position settings.

Setting the Supply Type

You can print on center aperture, black mark, die cut, continuous, or tag edge aperture supplies. You have to tell the printer which supplies you are using.

If using edge aperture tag stock containing an RFID antenna, select Tag Edge Aperture.



Tag Edge Aperture supply

To change the setting, from the Main Menu, select Setup, then Supply. If password protection in enabled, press **Feed/Cut** three times, then press **Enter/Pause** before you see the Setup Menu options. Then, follow these steps.

1. Press ← or → until you see

SUPPLY
Supply Type →

2. Press **Enter/Pause** to set the supply type option. The current setting is displayed, for example:

SUPPLY TYPE
← Black Mark →

3. Press ← or → to see the other options. After you display the option you want, press **Enter/Pause**.

4. Press **Escape/Clear** until you see the Main Menu.

Setting the Error Action

The recovery action from an error condition is in the Setup, Supply Menu. You can change how the printer responds to a bad label. The choices include normal and overstrike/continue one to five consecutive bad labels. The overstrike pattern is created to prevent someone from using the label.

Selecting overstrike and continue 1x-5x sets the number of times the printer prints an overstrike pattern on **consecutively bad labels** before generating an error. The user must clear the error before operation can continue.

Consider this scenario when the error action is set to overstrike/continue 3x:
If the printer errors on the first label, an overstrike pattern is printed, but the printer attempts to reprint the image up to three times. If the third consecutive label **also** generates an error, an overstrike pattern is printed; however, the printer stops and the error message is displayed. The operator must resolve the error condition before printing continues.

In the above example, if the third label did **NOT** generate an error,

- the batch image is printed
- the consecutive error counter is reset
- the printer continues processing the batch.

Error Action Modes

Normal (default)	The printer errors and the condition causing the error is displayed. The error must be cleared before operation can continue. An operator must press **Escape/Clear** to clear the error and continue printing. No overstrike pattern is printed.
Overstrike/Continue 1x **Overstrike/Continue 2x** **Overstrike/Continue 3x** **Overstrike/Continue 4x** **Overstrike/Continue 5x**	The printer prints an overstrike pattern on one, two, three, four, or five consecutive labels and stops printing after the selected number of overstrike patterns have been printed. An operator must press **Escape/Clear** to clear the error and continue printing.

Note: The printer does **not** recalibrate (feed a blank label) after any RFID error.

For more information about the error actions, see the following table.

Error Action	Standard Peel	Verifier with Peel	RFID with Peel
Overstrike/Continue 1-5	No	No	No
Normal (no overstrike)	Yes	Yes	Yes

Note: If using the Overstrike and Continue error mode, do not use peel mode.

To change the setting, from the Main Menu, select Setup, then Supply. Then follow these steps.

1. Press ← or → until you see

   ```
     SUPPLY
   ← Error Action
   ```

2. Press **Enter/Pause**. The current setting is displayed, for example:

   ```
     ERROR ACTION
   ← Ostrk/Cont 1x  →
   ```

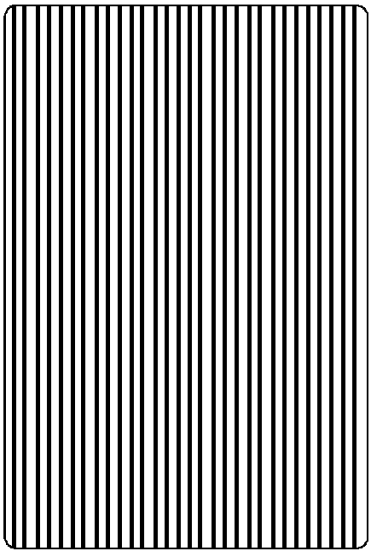
3. Press ← or → see the other options. After you display the option you want, press **Enter/Pause**.

4. Press **Escape/Clear** until you see the Main Menu.

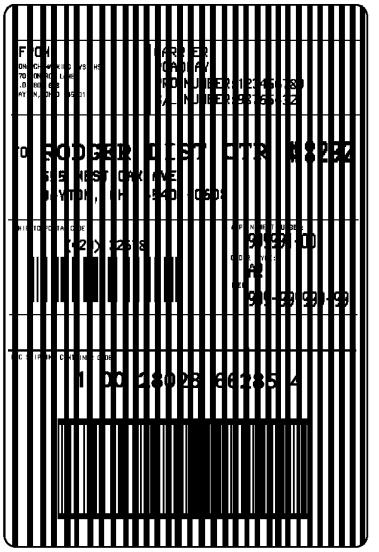
Note: Depending on the selected error action, you may or may not see a label with the overstrike pattern.

If an RFID error occurs, the format is *not printed* on the label, but the overstrike pattern is.

If a non-RFID error (verifier error) occurs, the format prints on the label with the overstrike pattern.



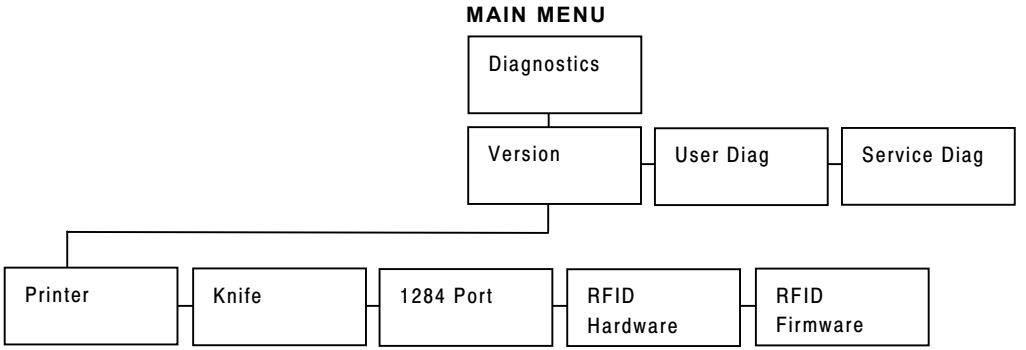
RFID Overstrike



Non- RFID Overstrike printed from a verifier error

Version Information

The RFID version information is included in the Diagnostics Menu. When prompted for the diagnostics password, press **Feed/Cut** three times and then press **Enter/Pause**.



1. From the Diagnostics Menu, press ← or → until you see

   ```
   DIAGNOSTICS
      Version          →
   ```

2. Press **Enter/Pause**.

   ```
      VERSION
   ←  RFID Hardware    →
   ```

3. Use ← or → to see all the options: Printer, Knife, 1284 Port, RFID Hardware, or RFID Firmware. After you display the option you want, press **Enter/Pause**. A screen similar to this one is displayed:

   ```
      Model M9855
        931110841
   ```

   The RFID versions are for the antenna/board (hardware) and firmware. Your version information for Hardware and Firmware may appear different from the one shown.

   You can also display the Firmware and Hardware Versions by printing an RFID Configuration Label. See Chapter 2, "Multi-Protocol Encoding," for more information.

4. Press **Escape/Clear** until you see the Main Menu.

Additional Font

An additional font, PaxarSymbols has been added to version 5.0 or greater software. Currently, it contains one symbol, which is referenced by using the capital letter A in the batch data.

- Use number 56 for the font identifier in the Text Field.
- Use a large enough point size (height and width magnification) to display this graphical symbol.

Example `T,2,10,V,250,50,0,56,30,30,B,L,0,0,0¦`

Font Number

Point Size (Height and Width Magnification)

Prints this symbol using the capital letter A in the batch data, for example:

```
{B,1,N,1¦
2,"A"¦}
```

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DEFINING THE RFID DATA FIELD

4

The Monarch® Printer Control Language II (MPCLII) RFID Data Field contains the information you want programmed into the RFID tag. The printer can accept EPC data following the guidelines in the *EPC™ Generation 1 Tag Data Standards* Specification or the *EPCglobal™ Tag Data Standards* Specification, which conforms to the *EPC Radio-Frequency Identity Protocols Class 1 Generation 2 UHF RFID Protocol for Communications at 860-960MHz Standards* (RFID Air Interface protocol). Refer to the EPC Specification to create valid EPC data.

This chapter details the syntax of the RFID Data Field and explains how to use Expanded Gen2 data.

The syntax of the RFID Data Field is similar to the standard non-printable text field format.

Syntax **`X,field#,#ofchar,data_type¦`**

X1. *X* — RFID Data Field.

X2. *field#* — Unique number from **0-999** assigned to this field.

X3. *#ofchar* — This number must be equal to or greater than the total number of characters in the RFID Data Field. Range: **0-2710**. The amount varies according to your RFID data and protocol. For example, C1Gen2 can be 96 bits, **plus** the access password, lock code, etc.

Note: An error 715 occurs if the printer does not receive the correct amount of data. You can pad data to make sure you have the correct amount of bits. See "Using Option 30," for more information.

X4. *data_type* Data type. Options:

- **0** ASCII Hex - default (ASCII representation of Hex). Use characters **A** to **F** and **0** to **9**.
- **1** ASCII
- **2** ASCII Binary (ASCII representation of Binary). Use characters **0** or **1**.
- **3** Hex

We recommend using ASCII Hex for compatibility with multiple host applications. You should know the data type your host provides.

For example, the letter A has a decimal value of 65 in the ASCII table. The hex (base 16) equivalent of decimal (base 10) is 41. Hex 41 in binary notation is 01000001.

Data Type	Character	MPCL Batch Data for a 96-bit RFID tag
ASCII Hex	41	"414141414141414141414141"
ASCII	A	"AAAAAAAAAAAA"
ASCII Binary	01000001	"010000010100000101000001010000010100000101000000 101000001 010000010100000101000001010000010100000101000001"
Hex	~065	"~065~065~065~065~065~065~065~065~065~065~065~065"

Example **X,5,24,0¦**

Defines an RFID Data Field (field #5) with exactly 24 ASCII Hex characters for a 96-bit RFID tag.

Sample Format

```
{F,1,A,R,E,600,400,"RDCI"¦
L,V,500,115,90,85,3¦
L,V,298,245,90,102,3¦
C,568,8,0,2,2,2,B,L,0,0,"FROM:",0¦
C,568,125,0,2,2,2,B,L,0,0,"CARRIER:",0¦
C,387,8,0,2,1,1,B,L,0,0,"(420) SHIP TO POSTAL CODE",0¦
C,391,250,0,2,1,1,B,L,0,0,"APPOINTMENT NUMBER:",0¦
C,327,250,0,2,1,1,B,L,0,0,"ITEM:",0¦
C,190,8,0,2,1,1,B,L,0,0,"UPC SHIPPING CONTAINER CODE",0¦
T,1,15,V,529,220,0,2,2,2,B,L,0,0,0¦
B,3,13,V,311,28,8,4,50,8,L,0¦
B,4,14,V,17,60,50,5,130,8,L,0¦
X,5,24,0¦                                   <- RFID Data Field
T,6,20,V,415,270,0,50,15,15,B,L,0,2¦
R,4,5,1,16,1,0¦                             <- Copy Option from field 5 (RFID Data Field) to field 6 (Text field)
…}
```

Sample Batch Data

```
{B,1,N,1¦
1,"RFID TEST"¦
3,"1005678"¦
4,"67-90-32"¦
5,"3123456789ABCDEF12345678"¦
6,"ABCDEFG"¦
…}
```

The RFID Data Field contains exactly 24 characters of data in ASCII Hex format for a 96-bit RFID tag.

Applying Options to the RFID Data Field

All the normal field options (copy, merge, pad, increment, etc.) can be applied to the RFID Data Field. However, certain restrictions may apply.

- To copy, merge, pad, or increment data in the RFID Data Field, the copied/merged/padded/incremented data **must** be in the same format specified in the RFID Data Field. For example, **to copy data into** the RFID Data Field using ASCII Hex, the field being copied **must** be in ASCII Hex format; otherwise, unexpected results may occur.
- When incrementing the RFID Data Field, see the following table for an explanation of how the field increments.

Data Type	How the Field Increments
ASCII Hex	0 to F (0123456789ABCDEF), then back to 0
ASCII Binary	0 to 1 or 1 to 0
ASCII or Hex	next position in 0 to 255 range

- If Option 60 (Increment Field) contains the character “D” to decrement, it is ignored and the field is instead incremented by one.
- When incrementing the RFID Data Field, the only valid value to increment is by **one**.
- Use caution when incrementing an RFID field if data is coming directly from your host because the field must be incremented in ASCII Hex (or other specified data type).

Copy Option Example

```
{F,2,A,R,E,400,400,"ASCIIHEX"¦
X,2,24,0¦
T,1,50,V,10,10,0,1,1,1,B,L,0,0¦
R,4,2,1,16,1,2¦}

{B,2,N,2¦
1,"313233343536373831323334"¦
2,"313233343536373831323334"¦}
```

Copy data from RFID Data field to text field

This example uses option 4 to copy data from the RFID Data Field and displays the data in text field 1. Note the data type being used is ASCII Hex, so the data in the RFID Data Field is in ASCII Hex format. This example uses a 96-bit RFID tag.

Using Option 5 (Define Data Entry Sources)

Use this option to read pre-programmed data in the RFID chip embedded within the supply. Using Option 5 stops the printer while reading each label; regardless of the print speed. If using a batch quantity greater than one, the data is read from each label.

Note: Using Option 5 to read pre-programmed RFID data is supported with the release of version 5.0 or greater printer's software. The EM4122 protocol requires Option 5 to read the pre-programmed data.

When reading data, make sure the maximum number of characters in the field is equal to or greater than the number of characters being read. If not, the data may be incomplete.

Use option 6 (Upload Field Data) with Option 5 to upload the data from the RFID chip to a host.

Syntax `R,5,code¦`

R1. *R* — Option Header.

R2. 5 — Option 5.

R3. *code* — Input code for the data in the field. Options:

- **H** Host
- **K** Keypad
- **N** No user input for this field
- **R** RFID (read data from the RFID chip). This is ignored on non-RFID printers.

Note: Option 5 re-images each label in the batch.

Example
```
T,2,10,V,250,50,0,1,1,1,B,C,0,0,0¦
R,5,R¦
```

Reads the pre-programmed data from the RFID chip and saves that data into the text field.

Using Option 6 (Upload Field Data)

You can upload data from any field using Option 6. When uploading multiple fields of data, the data is comma separated.

Data is uploaded to the last port that received host data (serial, parallel, USB, or Ethernet) at the end of the batch or label, depending on the other options used as follows:

- When using a batch quantity of one without Option 5 or Option 60, data is uploaded at the end of the batch.
- When using a batch quantity greater than one with an Option 5 and/or Option 60, data is uploaded after each label.

Note: To upload data on a field that did not change, apply Option 60 to that field.

Syntax `R,6,device¦`

R1. *R* — Option Header.

R2. *6* — Option 6.

R3. *device* — Last port that received host data. Use **H** (host).

Example `T,2,10,V,250,50,0,1,1,1,B,C,0,0,0¦`
`R,6,H¦`

Uploads the text field's data to a file.

Example `B,3,12,F,50,50,1,2,60,7,L,0¦`
`R,6,H¦`
`R,60,I,0¦`

Uploads the UPCA bar code field's data to a file and uploads data for each label in the batch.

Example `T,150,V,230,130,0,1,1,1,B,L,0,0¦`
`R,5,R¦`
`R,6,H¦`

Reads the RFID data from the RFID chip embedded in the supply. Uploads the data to the last-used port.

Example `{F,1,A,R,E,600,400,"RDCI"¦`
…
`X,5,24,0¦`
`T,6,20,V,415,270,0,50,15,15,B,L,0,2¦`
`R,4,5,1,16,1,0¦`
`R,6,H¦`
`…}`

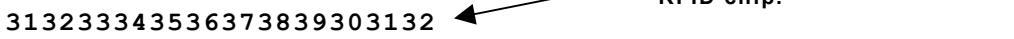
Copies data from field 5 (RFID Data Field) to field 6 (Text field). Uploads the data to the last-used port.

Sample Upload Packet

Example `R,5,R¦`
`R,6,H¦`

Returns the following in the upload packet:

Pre-programmed data in the RFID chip.



Example **B,3,12,F,50,50,1,2,60,7,L,0¦**
R,6,H¦

Returns the following in the upload packet:

123456789012 ← **UPCA bar code data entered from the batch.**

Example **R,5,R¦**
R,6,H¦
B,3,12,F,50,50,1,2,60,7,L,0¦
R,6,H¦

Returns the following in the upload packet:

313233343536373839303132,123456789012

Pre-programmed data in the RFID chip and the UPCA bar code data entered from the batch.

Using Option 30 (Pad Data)

You can add characters to one side of a field to "pad" the field. Padding allows you to fill in the remaining spaces when the entered data does not fill an entire field.

If a variable length field is not completely filled with batch data, this option fills the remaining positions in the field with the character designated by Option 30.

Syntax `R,30,L/R,"character"¦`

R1. *R* Option Header.

R2. *30* Option 30.

R3. *L/R* Indicates type of padding

L Pad field on left side
R Pad field on right side

R4. *"character"* Pad character must be within the **0** - **255** decimal range and enclosed inside quotation marks.

Note: The pad character must be in the same format specified in the RFID Data Field. See "Defining the RFID Data Field" for more information.

Example `R,30,L,"A"¦`

Pads data with an "A" on the left side of the field.

Example

```
X,2,24,0¦
R,30,R,"0"¦
```

Pads the data in the RFID Data Field with a "0" on the right side of the data. This example uses a 96-bit RFID tag.

96-Bit RFID Data Field Examples

The following examples can be used for C1Gen1 and C1Gen2 (without locking). See "Using Expanded Gen2 Data" for more information about using the locking feature.

The 96-bit data that can be displayed using the printer's Setup, RFID Menu for all these examples is the same: "313233343536373839303132." See "Read Tag" for more information about displaying what is programmed into an RFID tag.

ASCII HEX Example

```
{F,2,A,R,E,400,400,"ASCIIHEX"¦
T,1,50,V,10,10,0,1,1,1,B,L,0,0¦
X,2,24,0¦}

{B,2,N,1¦
1,"313233343536373839303132"¦
2,"313233343536373839303132"¦}
```

ASCII Hex data type is selected in the RFID Data Field and the batch data is entered as ASCII Hex.

ASCII Example

```
{F,2,A,R,E,400,400,"ASCII"¦
T,1,50,V,10,10,0,1,1,1,B,L,0,0¦
X,2,12,1¦}

{B,2,N,1¦
1,"123456789012"¦
2,"123456789012"¦}
```

ASCII data type is selected in the RFID Data Field and the batch data is entered as ASCII.

ASCII BINARY Example

```
{F,2,A,R,E,400,400,"ASCIIBIN"¦
T,1,96,V,10,10,0,2,1,1,B,L,0,0¦
X,2,96,2¦}

{B,2,N,1¦
1,"00110001001100100011001100110100001101010011011000110111
10011100000111001001100000011000100110010"¦
2,"00110001001100100011001100110100001101010011011000110111
10011100000111001001100000011000100110010"¦}
```

Note: The ASCII Binary data needs to be entered on one line. Do not use line breaks to wrap the data. This data is shown on several lines because of the font size and margins.

ASCII Binary data type is selected in the RFID Data Field and the batch data is entered as ASCII Binary.

HEX Example

```
{F,2,A,R,E,400,400,"HEX"¦
T,1,50,V,10,10,0,1,1,1,B,L,0,0¦
X,2,12,3¦}

{B,2,N,1¦
1,"~049~050~051~052~053~054~055~056~057~048~049~050"¦
2,"~049~050~051~052~053~054~055~056~057~048~049~050"¦}
```

Hex data type is selected in the RFID Data Field and the batch data is entered as Hex.

Note: Tilde numbers are decimal 0 – 255, which is how Hex values must be entered.

SSCC96 Example

```
{F,45,A,R,E,600,400,"SSCC96"¦
C,45,220,0,50,10,10,B,L,0,2,"®"¦
C,75,385,0,50,40,30,B,L,0,2,"Monarch RFID"¦
C,110,385,0,50,6,6,B,L,0,2,"SHIP TO RFID USER"¦
C,110,150,0,50,6,6,B,L,0,2,"CARRIER"¦
C,150,150,0,50,9,9,B,L,0,2,"PRO:"¦
C,165,150,0,50,9,9,B,L,0,2,"B/L:"¦
C,200,380,0,50,18,15,B,L,0,2,"PAXAR AMERICAS, Inc."¦
C,235,380,0,50,14,12,B,L,0,2,"EMAIL: RFID@PAXAR.COM"¦
C,255,380,0,50,14,12,B,L,0,2,"PHONE: 1 800 543-6650"¦
C,275,345,0,50,6,6,B,L,0,2,"VENDOR STK NO:"¦
C,275,110,0,50,6,6,B,L,0,2,"PACK/UNITS:"¦
C,360,330,0,50,10,10,B,L,0,2,"EPC Pure Identity:"¦
C,275,190,0,50,6,6,B,L,0,2,"COLOR:"¦
C,315,110,0,50,6,6,B,L,0,2,"SIZE/STYLE:"¦
C,415,390,0,50,12,12,B,L,0,2,"EPC#:"¦
L,S,098,005,098,395,6,""¦
L,S,170,005,170,395,6,""¦
L,S,098,155,170,155,6,""¦
L,S,260,005,260,395,6,""¦
L,S,390,005,390,395,6,""¦
T,1,15,V,130,335,0,50,13,12,B,L,0,2¦
B,2,15,V,165,365,8,4,25,0,L,2¦
T,3,20,V,130,150,0,50,13,12,B,L,0,2¦
T,4,20,V,150,110,0,50,10,12,B,L,0,2¦
T,5,20,V,165,110,0,50,10,12,B,L,0,2¦
T,12,10,V,295,370,0,50,15,18,B,L,0,2¦
T,13,10,V,295,110,0,50,15,18,B,L,0,2¦

T,14,50,V,380,385,0,50,12,11,B,L,0,2¦   <-- Text Field with EPC Data
T,15,10,V,295,200,0,50,15,18,B,L,0,2¦
T,16,10,V,335,155,0,50,15,18,B,L,0,2¦
T,18,30,V,550,330,0,50,15,18,B,L,0,2¦
B,17,20,V,530,340,50,6,110,0,L,2¦

X,19,24¦   <-- RFID Data Field

T,20,40,V,415,330,0,50,12,13,B,L,0,2¦
R,4,19,1,40,1,1¦}
```

Batch Data

```
{B,45,N,1¦
1,"VENDOR USA"¦
2,"42060512"¦
3,"PAXAR AMERICAS"¦
4,"0987764356"¦
5,"0020545640"¦
12,"0075687332"¦
13,"3600"¦

14,"urn:epc:tag:sscc-96:1.0028028.0000001235"¦
15,"RED"¦
16,"48~"/TOUGH"¦
17,"009280287586887"¦
18,"0  09  28028  75688  7"¦

19,"313401B5F0000004D3000000"¦
20,"0"¦}
```

Text Field Batch Data

RFID Field Batch Data

SGTIN 96 Example

```
{F,46,A,R,E,600,400,"SGTIN96"¦
C,45,220,0,50,10,10,B,L,0,2,"®"¦
C,75,385,0,50,40,30,B,L,0,2,"Monarch RFID"¦
C,110,385,0,50,6,6,B,L,0,2,"SHIP TO RFID USER"¦
C,110,150,0,50,6,6,B,L,0,2,"CARRIER"¦
C,150,150,0,50,9,9,B,L,0,2,"PRO:"¦
C,165,150,0,50,9,9,B,L,0,2,"B/L:"¦
C,200,380,0,50,18,15,B,L,0,2,"PAXAR AMERICAS, Inc."¦
C,235,380,0,50,14,12,B,L,0,2,"EMAIL: RFID@PAXAR.COM"¦
C,255,380,0,50,14,12,B,L,0,2,"PHONE: 1 800 543-6650"¦
C,275,345,0,50,6,6,B,L,0,2,"VENDOR STK NO:"¦
C,275,110,0,50,6,6,B,L,0,2,"PACK/UNITS:"¦
C,360,330,0,50,10,10,B,L,0,2,"EPC Pure Identity:"¦
C,275,190,0,50,6,6,B,L,0,2,"COLOR:"¦
C,315,110,0,50,6,6,B,L,0,2,"SIZE/STYLE:"¦
C,415,390,0,50,12,12,B,L,0,2,"EPC#:"¦
L,S,098,005,098,395,6,""¦
L,S,170,005,170,395,6,""¦
L,S,098,155,170,155,6,""¦
L,S,260,005,260,395,6,""¦
L,S,390,005,390,395,6,""¦
T,1,15,V,130,335,0,50,13,12,B,L,0,2¦
B,2,15,V,165,365,8,4,25,0,L,2¦
```

```
T,3,20,V,130,150,0,50,13,12,B,L,0,2¦
T,4,20,V,150,110,0,50,10,12,B,L,0,2¦
T,5,20,V,165,110,0,50,10,12,B,L,0,2¦
T,12,10,V,295,370,0,50,15,18,B,L,0,2¦
T,13,10,V,295,110,0,50,15,18,B,L,0,2¦

T,14,50,V,380,385,0,50,12,11,B,L,0,2¦
T,15,10,V,295,200,0,50,15,18,B,L,0,2¦
T,16,10,V,335,155,0,50,15,18,B,L,0,2¦
T,18,30,V,550,330,0,50,15,18,B,L,0,2¦
B,17,20,V,530,340,50,6,110,0,L,2¦

X,19,24¦

T,20,40,V,415,330,0,50,12,13,B,L,0,2¦
R,4,19,1,40,1,1¦}
```

Text Field with EPC Data

RFID Data Field

Batch Data

```
{B,46,N,1¦
1,"VENDOR USA"¦
2,"42060512"¦
3,"PAXAR AMERICAS"¦
4,"0987764356"¦
5,"0020545640"¦
12,"0075687332"¦
13,"3600"¦

14,"urn:epc:tag:sgtin-96:1.0028028.001234.2"¦
15,"RED"¦
16,"48~"/TOUGH"¦
17,"009280287586887"¦
18,"0  09  28028  75688  7"¦

19,"303401B5F001348000000002"¦
20,"0"¦}
```

Text Field Batch Data

RFID Field Batch Data

Using Expanded Gen2 Data

With version 5.0 or greater software, we support Expanded C1Gen2 data, which is composed of five different fields:

- EPC Data (64 or 96-bit)
- User Memory
- Access Password
- Kill Password
- Lock Code

The printer also accepts EPC data following the guidelines in the *EPCglobal™ Tag Data Standards* Specification, which conforms to the *EPC Radio-Frequency Identity Protocols Class 1 Generation 2 UHF RFID Protocol for Communications at 860-960MHz Standards* (RFID Air Interface protocol). Refer to the EPC Specification to create valid EPC data.

Many different RFID supplies (tags) are available and the amount of programmable user memory varies with the chip embedded in the tag. Depending on your tag type, all memory fields may not be available. Refer to the *RFID Setup Guide & Supply Chart* for details about the available user memory for each chip.

Note: Incrementing an Expanded C1Gen2 RFID Data Field is not supported.

Use the access password to control when new data can be written to a field. The kill password sets a tag up to be inoperable. The lock code contains the locking method.

One of the four locking methods can be selected for each memory field (EPC, user memory, access password, and kill password). Depending on the locking method specified, the memory field may or may not be readable or writable. There are four locking methods.

Value	EPC Lock Name	Description
0	No lock (unsecure)	The selected memory fields (EPC, user memory, access password and kill password) are readable and writable. The tag can be programmed multiple times.
1	Permalock (permanently unsecure)	Permanently locked in a readable and writable state. The tag can be programmed multiple times.
2	Password lock (secure)	Requires the access password to rewrite the selected memory fields. The tag can be programmed multiple times *with the password*.
3	Permalock and Password lock (permanently locked)	Never rewritable, but always readable. The tag can never be rewritten, once locked.

Note: The EPC field is always readable, no matter what locking method is assigned.

The following table describes the locking method for each memory field.

EPC Memory	Description
0	EPC is readable and writable.
1	EPC is permanently writable (can never be locked).
2	EPC is only writable with password, but is readable.
3	EPC is never rewritable, but is readable.
User Memory	**Description**
0	User memory is readable and writable.
1	User memory is permanently writable (can never be locked), but is readable.
2	User memory is only writable with password, but is readable.
3	User memory is never rewritable, but is readable.
Access Password	**Description**
0	Access password is readable and writable.
1	Access password is permanently writable (can never be locked).
2	Access password is never readable.
3	Access password is never readable or rewritable.
Kill Password	**Description**
0	Kill password is readable and writable.
1	Kill password is permanently writable (never locked), but is readable.
2	Kill password is only writable with password.
3	Kill password is never readable or rewritable.

To use the Expanded C1Gen2 data, you need to modify the RFID Field's batch data.

Syntax **`field#,"EPC_data~028"¦`**
`C,"User_Mem~028"¦`
`C,"~028"¦`
`C,"Acs_Pwd~028"¦`
`C,"Kill_Pwd~028"¦`
`C,"Lock_Code"¦`

field#	Identifies the RFID Data Field number for the following data. Range: **1** - **999**.
"EPC_data~028"	EPC data. Enclose in quotation marks. To create EPC data, follow the guidelines in the *EPC Global Generation 1 Tag Data Standards Specification*. The data **must** be in the same format (ASCII Hex, ASCII, etc.) specified in the RFID Data Field (*data_type*). The printer can program 96-bits of data (24 ASCII Hex characters). The data must end with the ASCII field separator (decimal 028).
C,"User_Mem~028"	User Memory. Enclose in quotation marks. The amount of programmable user memory varies with the tag types. Refer to the *RFID Setup Guide & Supply Chart* for details about the available user memory for each chip. The printer can program up to 304-bits of data (76 ASCII Hex characters). The data must be ASCII Hex characters and end with the ASCII field separator (decimal 028).

Note: Do not enter more characters than the user memory space available. For example, if your tag has 96-bit user memory available, you cannot enter more than 96-bits of data for this field. However, you can enter less than 96-bit without an error.

C,"~028"	Identifies information to be appended. Reserved for future use. Only include the field separator (decimal 028) in this field.
C,"Acs_Pwd~028"	Access Password. This must be 8 ASCII Hex characters. No password is assigned if this field is left blank. The data must end with the ASCII field separator (decimal 028).
C,"Kill_Pwd~028"	Kill Password. This must be 8 ASCII Hex characters. No password is assigned if this field is left blank. The data must end with the ASCII field separator (decimal 028).

C,"Lock_Code" Five-digit locking method for each field in this order:
EPC Data, User Memory, Reserved, Access password, and Kill password. Use 0 for the reserved field.
Locking options:

- **0** No Lock
- **1** Permalock
- **2** Password lock
- **3** Permalock & password lock

Note: Use only one locking method per field.
The printer is not capable of unlocking a field. Depending on the locking method used for each field, the EPC data *may* be programmable by sending the access password with the batch data. See the following examples.

Permalock Example

```
{F,1,A,R,E,400,400,"PERMLOCK"¦
X,1,100,0¦}

{B,1,N,1¦
1,"313233343536373831323334~028"¦
C,"ABCDEF~028"¦
C,"~028"¦
C,"73737373~028"¦
C,"CAD01234~028"¦
C,"11001"¦}
```

RFID Data Field

EPC Data
User Memory
Reserved
Access Password
Kill Password
Lock Method for each field:

Parameter	Description	Data
One	EPC	**1**
Two	User Memory	**1**
Three	Reserved	**0**
Four	Access Password	**0**
Five	Kill Password	**1**

The EPC data is 313233343536373831323334, the user memory data is ABCDEF, the access password is 73737373, and the kill password is CAD01234. Selects permalock (1) as the locking method for the EPC, user memory, and kill field. Selects no lock (0) for the access password field. The EPC, user memory, and kill fields are **permanently** readable/writable.

Password Lock Example

```
{F,1,A,R,E,400,400,"PWDLOCK"¦
X,1,100,0¦}                              RFID Data Field

{B,1,N,1¦
1,"31323334353637383132333 4~028"¦       EPC Data
C,"ABCDEF ~028"¦                         User Memory
C,"~028"¦                                Reserved
C,"73737373~028"¦                        Access Password
C,"CAD01234~028"¦                        Kill Password
C,"22022"¦}                              Lock Method for each field
```

The EPC data is 313233343536373831323334, the user memory data is ABCDEF, the access password is 73737373, and the kill password is CAD01234. Selects password lock (2) as the locking method for the EPC, user memory, access, and kill fields. To change the EPC, user memory, or kill fields, the *access password must be sent* with the batch data.

Both Lock Example

```
{F,1,A,R,E,400,400,"BOTHLOCK"¦
X,1,100,0¦}                              RFID Data Field

{B,1,N,1¦
1,"31323334353637383132333 4~028"¦       EPC Data
C,"ABCDEF ~028"¦                         User Memory
C,"~028"¦                                Reserved
C,"73737373~028"¦                        Access Password
C,"CAD01234~028"¦                        Kill Password
C,"33033"¦}                              Lock Method for each field
```

The EPC data is 313233343536373831323334, the user memory data is ABCDEF, the access password is 73737373, and the kill password is CAD01234. Selects permalock and password lock (3) as the locking method for the EPC, user memory, access, and kill fields, which means these fields are never rewritable. The EPC data can only be programmed ONE time.

TROUBLESHOOTING 5

Use this chapter as a reference for any RFID errors you may receive.

Problem	Action
Printer displays “Please Wait RFID Initialization.”	You sent an RFID batch before the printer communicated with the interrogator. The printer prints the RFID batch once communication with the interrogator is complete.
Printer displays “RFID Detection Not Complete.”	You tried to access the Setup, RFID Menu before the printer communicated with the interrogator. Press **Escape/Clear** until you see “Print Mode Ready.” Wait several seconds and then try to access the Setup, RFID Menu again.
Printer displays “Monarch Initializing.”	This message should flash briefly on the display when you turn on the RFID printer. If it does not disappear, turn off the printer; wait fifteen seconds and then turn on the printer.
Printer does not read or program the RFID tag.	Make sure the following are set correctly for your inlay (RFID tag) type: Protocol (C1Gen1, EM4122, etc.), Read Power, Write Power, and Signal Adjust. Refer to your *RFID Setup Guide & Supply Chart* for more information. The EM4122 protocol requires option 5 to read the pre-programmed RFID data. See Chapter 4, “Defining the RFID Data Field” for more information.

052 **Data type in the RFID Data Field must be 0, 1, 2, or 3**. See "Defining the RFID Data Field" for more information.

226 **Rule Record Line xx.** Upload device must be **H** (Host) for Option 6.

715 **Invalid data length/data mismatch**. The data in the RFID Data Field has an incorrect data length or there is a data type mismatch between selected data type and actual data entered. See "Defining the RFID Data Field" for more information on the data length and for selecting the appropriate data type for the data being entered. This error also occurs when there is an error in the Expanded C1Gen2 fields. Check with your System Administrator about your format.

740 **Command, hardware, inventory, or memory allocation error**. There may be an RFID hardware or memory allocation error.

741 **RFID tag missing**. Tag not found in RF Field. The RFID tag was not found in the RF Field (area inside the printer where RFID tag is programmed.) Check supply loading. If you made supply or print position settings, make sure the RFID tag was not moved out of the programmable range. See "About RFID Supplies," in Chapter 2 for more information.

742 **Tag erase failed**. The RFID tag was found in the RF Field, but could not be erased. Increase the number of retries. If this error occurs consecutively, increase or decrease the RFID power setting by one. If the RFID power is set too low, you may affect the data programmed in adjacent labels.

743 **Program tag failed**. The RFID tag was found in the RF Field, but could not be programmed. Increase the number of retries. If this error occurs consecutively, increase or decrease the RFID power setting by one. If the RFID power is set too low, you may affect the data programmed in adjacent labels.

744 **Tag locked fail**. The RFID tag is unable to be programmed, because it is already locked. This is considered a bad RFID tag. See "Error Action" on how to handle the error.

746 **Lock tag fail**. The RFID tag has not been locked to prevent reprogramming. This is considered a bad RFID tag. See "Error Action" on how to handle the error.

747 **Time out failure**. Any RFID command (read, program, etc.) has failed to complete in the maximum amount of allowed time.

748 **Invalid data length/data mismatch from RFID interrogator module**. The RFID interrogator module found a problem with the data received from the printer.

749 **RFID Verify Fail**. The RFID verification process failed after writing (programming) tag. This is considered a bad RFID tag. See "Error Action" on how to handle the error.

The printer does not recalibrate (feed a blank label) after any RFID error. Call Technical Support for any message not listed.

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